Several Observations and Suggestions for Those Planning to Pursue Leadership Computing Facility (LCF) Allocations

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Allocation Programs at the LCFs

	60% INCITE		30% ALCC		10% Director's Discretionary	
Mission	High-risk, high-payoff science that requires LCF-scale resources*		High-risk, high-payoff science aligned with DOE mission		Strategic LCF goals	
Call	1x/year – (Closes June)		1x/year (Closes February)		Rolling	
Duration	1-3 years, yearly renewal		1 year		3m,6m,1 year	
Typical Size	30 - 40 projects	10M - 100M core-hours/yr.	5 - 10 projects	1M – 75M core-hours/yr.	100s of projects	10K – 1M core-hours
Review Process	Scientific Peer-Review	Computational Readiness	Scientific Peer-Review	Computational Readiness	Strategic impact and feasibility	
Managed By	INCITE management committee (ALCF & OLCF)		DOE Office of Science		LCF management	
Availability	Open to all scientific researchers and organizations *Capability >20% of cores*					

Source: http://www.alcf.anl.gov/files/L2PINCITE_0.pdf

Past Experience in LCF Allocations

- Multiyear INCITE award (2008, 2009, 2010):
  "Clean and Efficient Coal Gasifier Designs using Large-Scale Simulations"
  - Coordinator and lead in proposal preparation
  - Joint collaboration with NETL, ORNL and Alpemi Consulting LLC
  - Approx. 22 million hours at OLCF (Cray XT4 and XT5)
  - Started with Director's Discretionary allocation in 2007.

- ALCC award (2014):
  "Uncertainty Quantification in Coal Gasifier Simulations For Clean Energy Technology Development and Production"
  - Coordinator and lead in proposal preparation
  - Joint collaboration with Alpemi ,NETL & GE Global Research
  - 37.5 million hours at NERSC (Cray XE6 & XC30)

INCITE = Innovative and Novel Computational Impact on Theory and Experiment
ALCC = ASCR Leadership Computing Challenge

Several Observations & Suggestions

- Need to read the proposal preparation instructions very carefully, there may be changes each year & new requirements!
  - INCITE is more structured & strict compared to ALCC.
  - To avoid problems, make sure there is at least 1 or preferably 2 people who are responsible for the final proposal content and delivery if you don't want to receive e-mail like the below from the program staff:

    "It has come to my attention that the personnel justification of your proposal exceeds the page length guidelines. If you would like to submit a revised section (8c) by Tuesday, I would be happy to replace the file in your proposal."
  - Attend INCITE proposal writing webinars offered[1] and send inquiries directly, they are eager to help all potential applicants. Many other resources available through LCFs.

[1] URL: http://www.doeleadershipcomputing.org/2015-incite-proposal-writing-webinar/

Several Observations & Suggestions (cont'd)

- Need to be very clear in demonstrating why you need leadership class supercomputing allocation *'now'* and *cannot perform your scientific simulations somewhere else*.
  - Is you project considered high risk, high impact project?
  - Is your science relevant to the mission of the program (particularly for ALCC)?
  - Review the past awards in your discipline.
  - Be aware of the distinction between capability versus capacity computing issues regarding your computational needs and reasons to apply for LCF allocation.
  - Have a good & compelling story demonstrating the significance of your research project and impact.

Several Observations & Suggestions (cont'd)

- Need to demonstrate computational readiness preferably on the targeted system(s).
  - Both programs target applications that are ready to go in production runs and already tuned.
  - Use demonstrations with your proposed problem not a benchmark problem.
  - INCITE has additional requirements:
    - For example, scale well and achieve min. system utilization of 20%
  - ALCC also requires readiness but not as strict as INCITE.
  - Director's Discretionary allocation is ideal for computational readiness preparation & feasibility assessment

Several Observations & Suggestions (cont'd)

- Clearly describe how you will use the allocation.
- Need to justify the requested allocation.
- Provide sufficiently detailed contingency plan for what you can do with less allocation than what you are asking for
  - In both awards we got a portion of what we asked.

Several Observations & Suggestions (cont'd)

- Have a section that discusses the potential risks and your plans to mitigate these risks if you encounter these issues.
- Must have a good & balanced team in place a-priori.
- If you have any proprietary content, discuss in advance and seek mutually agreeable protocols.
  - Several months we couldn't visualize our simulation results

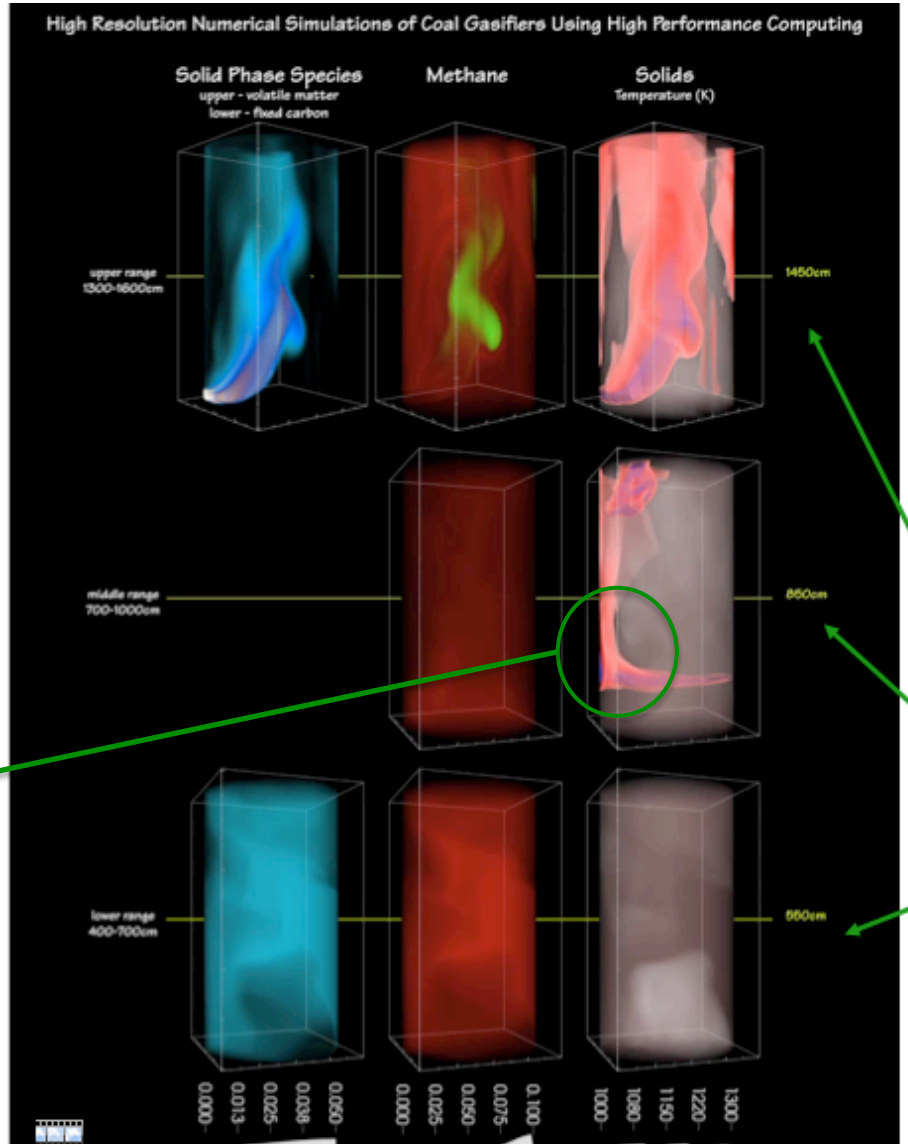
- It may take "several" iterations to get an allocation award from INCITE or ALCC programs:
  - Very competitive considering equivalent $ value being offered.
  - Be patient and carefully evaluate the reviewer comments to identify the deficiencies in the prior iteration to develop a stronger proposal.
  - Inquire with other award recipients, who are willing to help.

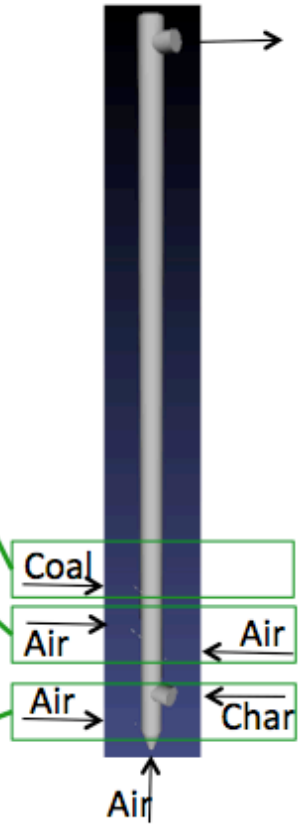
Several Observations & Suggestions
After Getting the Award

- Once you get the award, celebrate but get your team to start working immediately.
  - Many things can go wrong, or not as planned.
  - Do not forget the fact that you are using a shared resource with scheduled and unscheduled downtimes.
  - Do not hesitate to contact designated LCF site support staff when you encounter problems, they deal with similar problems daily basis and can help you find solutions quickly.
- Awards imply huge responsibility considering the actual cost of the services being offered freely under INCITE & ALCC programs:
  - For example, see how much Amazon cloud services would cost for equivalent hours of allocation without even offering the same level of tightly coupled HPC capability.
- Allocate sufficient time and effort with a good strategy to disseminate the results & acknowledge resources used.

Sometimes pictures speak louder than words, use visualization resources available at the LCFs to disseminate the findings from your simulations

Efficient way to disseminate the findings from 2.5 TB simulation data





Design engineers can see how the hot spots are formed, which may cause excessive refractory lining wear and frequent shutdown of the power plant costing substantial financial loss. Simulation can help engineers to develop robust designs.

Source: Visualizations prepared by A. Gel & OLCF Visualization Support for Commercial Scale Gasifier Simulations with MFIX as part of INCITE award https://mfix.netl.doe.gov/results.php#commercialscalegasifier